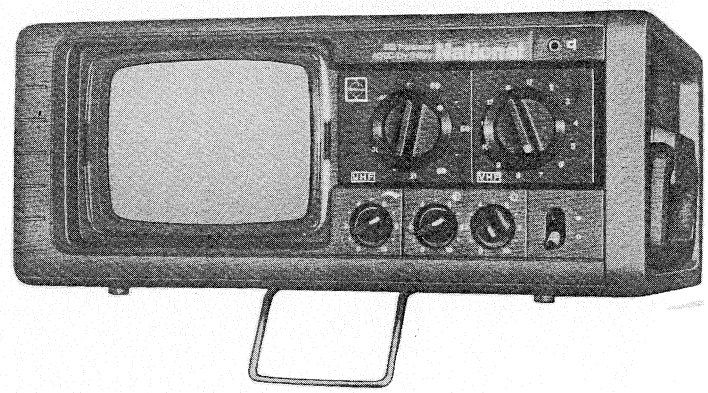
Service Manual

Black and White Television

TR-525ES

Chassis No.T505-E

Main Manual



Specifications

Power Source:	AC: 220V 50Hz DC: 12V
Power Consumption:	AC: 14W DC: 6W
Antenna:	UHF/VHF Monopole Antenna 75 Ohm Unbalanced Type UHF and VHF External Antenna 75 Ohm Balanced Type
Receiving Channel:	VHF CH. 2–12 UHF CH. 21–69 C.C.I.R Standard
Intermediate Frequency:	VIDEO I-F 38.9MHz SOUND I-F 33.4MHz
Picture Tube:	5'' 14cm (140AKB4) 55° Deflection Aluminized
Transistors:	26
Diodes:	19 1 Thermistor
High Voltage Rectifier:	1 (TVM567)
IC:	1 (AN240)
Speaker:	9cm Round Type
Audio Output:	Max. 350mW
Automatic Control Circuits:	Keyed AGC (Automatic Gain Control) Saw-Tooth AFC (Automatic Frequency Control) AVR (Automatic Voltage Regulator)
Dimensions:	Height: 15cm Width: 33.5cm Denth: 25.5cm
Weight:	4.1kg without battery

Technische Daten

Stromversorgung:	Netz: 220V 50Hz Batterie: 12V
Stromverbrauch:	Netz: 14W, Batterie: 6W
Antenne:	UHF/VHF Monopole Antenne 75Ohm Asymmetrisch UHF/VHF Aussenantenne 300Ohm Symmetrisch
Empfangskanäle:	VHF Kanäle 2–12 UHF Kanäle 21–69 Nach C.C.I.R. – Norm
Zwischenfrequenzen:	Video-ZF 38,9MHz TON-ZF 33,4MHz
Bildröhre:	14cm (140AK B4) 55° Ablenkung
Transistoren:	26
Dioden:	19 1 Thermistren
Hochspannung Gleichrichter:	1 (TVM567)
ICs:	1 (AN240)
Lautsprecher:	9cm, rund
NF-Ausgangsleistung:	350mW max.
Automatische Regelschaltungen Schaltungen:	Unverzögerte Schwundregelung Automatische Kippfrequenzregelung Automatische Spannungskonstanthaltung
Abmessungen:	Höhe: 15cm Breite: 33.5cm Tiefe: 25.5cm
Gewicht:	4.1Kg. ohne batterier

National

Matsushita Electric Trading Co., Ltd.
P.O. Box 288, Central Osaka Japan
CODE NO. TED.7701-105F

CAUTION

The high voltage supply at the picture tube anode will give an unpleasant shock, but does not supply enough current to give a fatal burn or shock. However, secondary human reaction to otherwise harmless shocks have been known to cause injury. Always discharge the picture tube anode to the receiver chassis before handling the tube.
Certain portions of the high voltage generating circuit are dangerous and extreme caution should be observed. The picture tube is highly evacuated and, if broken, glass fragments will be violently expelled.
WHEN HANDLING THE PICTURE TUBE, ALWAYS WEAR GOGGLES AND PROTECTIVE CLOTHING.

VORSICHT

Die Hochspannung der Bildröhrenanode genügt für einen unangenehmen Schlag, ist aber nicht hoch genug um Verbrennungen oder tödliche Schläge zu bewirken. Sekundäre Verletzungen als Folge harmloser Schläge sind jedoch vorgekommen. Vor Hantieren an der Bildröhre sollte daher die Anode längere Zeit über einen Widerstand von 100 K Ohm zum Chassis entladen werden.
Gewisse Abschnitte des Hochspannungskreises sind gefährlich; äusserste Vorsicht ist angebracht. Die Bildröhre steht unter Hochvakuum: beim Zerbrechen werden Glassstücke gefährlich umherfliegen.
BEIM HANTIEREN DER BILDRÖHRE IMMER SCHUTZBRILLE UND HANDSCHUHE TRAGEN!

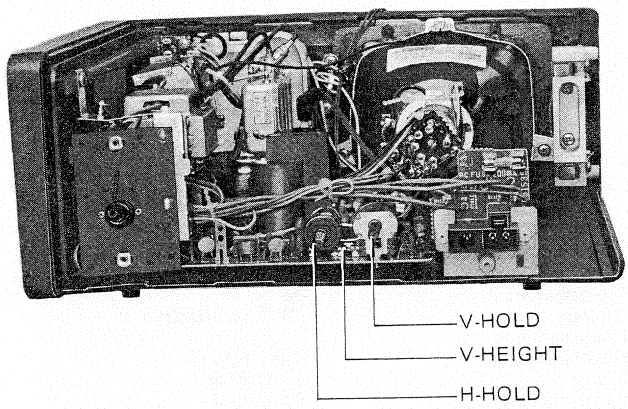


Fig. 1 Abb. 1

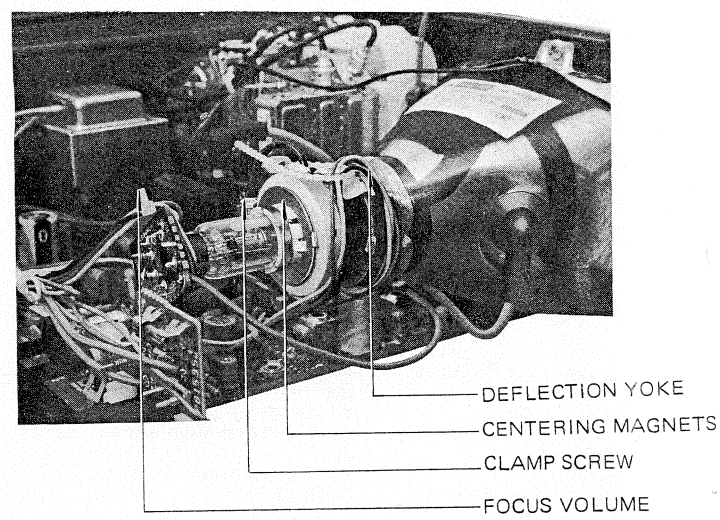


Fig. 2 Abb. 2

ADJUSTMENTS

VERTICAL HEIGHT AND VERTICAL LINEARITY

(1) These controls VR32 and VR33 should be adjusted simultaneously to give proper vertical size consistent with good vertical linearity.

Adjustment should be made to extend the picture limits approximately 3/16" (5 mm) beyond the top and bottom edges of the mask.

AGC (AUTOMATIC GAIN CONTROL)

The adjustment of the AGC control offectively changes the operating point of the AGC amplifier. Turn the I-F AGC control fully clockwise to set for maximum gain. In some areas this may cause clipping of the sync pulses, resulting in a wiggle in the picture and unstable sync. Turning the I-F AGC control counterclockwise direction will decrease the gain of the receiver.

TO ADJUST THE AGC PROPERLY

(1) Set the channel selector to a station transmitting a strong signal.
(2) Set the R-F AGC control VR19 to the center position.
(3) Turn the I-F AGC control VR18 fully counterclockwise, and the contrast and brightness controls fully clockwise.
(4) Adjust the I-F AGC control VR18 to obtain a sharp and clear picture. If I-F AGC control VR18 is turned fully clockwise, the input signal strength will be maximum.
(5) observing the input signal, turn the R-F AGC control VR19 clockwise or counterclockwise to the point where the snow noise disappears in the picture.
(6) Check the reception on all channels. There should be no wiggling. Make certain the picture does not disappear when the contrast control is turned to minimum.
(7) Readjust R-F AGC control slightly, if necessary. In very strong signal areas, where slight sync clipping is still evident, shorten antenna length to reduce sensitivity of the set.

AVR (AUTOMATIC VOLTAGE REGULATOR)

Connect a Volt meter across B + supply line and chassis. Next make certain B + supply voltage in +11.5V by adjusting the AVR control (VR71).

YOKE POSITION (Fig. 2)

The yoke is secured to the neck of the picture tube with a clamp and screw. To adjust the yoke and correct for picture tilt, loosen this clamp. Correct tilt and retighten the screw.

CENTERING (Fig. 2)

The picture centering device consists of two rings located at the rear of the yoke assembly. Each ring has a tab for ease of adjustment. The tabs should be rotated and moved towards or away from each other until the picture is properly centered on the screen of the picture tube.

HORIZONTAL WIDTH

Adjust the slug of coil to extend the picture about 13mm beyond the mask with the brightness control set to normal operating position.

ABSTIMMUNGEN

Bildhöhe und Linearität

(1) Die Regler VR32 und VR33 müssen gleichzeitig justiert werden, um richtige Übereinstimmung zwischen der Bildhöhe und der Linearität zu erreichen.

Die Justierung ist so vorzunehmen dass die Bildbegrenzung ca 5mm vom oberen und unteren Ende der Maske bleibt.

AGC (Automatische Verstärkungsregelung)

Die Einstellung des AGC Reglers ändert entschieden den Arbeitspunkt des AGC Verstärkers. Den AGC ZF Regler ganz nach Rechts drehen um Maximale Ver stärkung zu erreichen. Im manchen Bereichen wird dies ein Kappen der Synchronimpulse hervorrufen, sodass ein Flackern im Bild und Unstabilität in der Synchronisation die Folge ist, Linksdrehen des ZF AGC Reglers ruft einen Abfall in der Verstärkung des Empfängers hervor.

Korrekte Einstellung des AGC

(1) Kanalwähler auf einen starken Sender einstellen.
(2) T-F AGC Regler VR19 in Mittelstellung bringen.
(3) ZF AGC Regler VR18 bis Linksanschlag und den Kontrast und Helligkeits Regler bis Rechtsanschlag drehen.
(4) ZF AGC Regler VR18 so einstellen dass ein klares und scharfes Bild ensteht. Wenn der ZF AGC Regler VR18 bis Rechtsanschlag gedreht is, so ist die Eingangssignalstärke auf Maximum.
(5) Bildschirm beobachten, TF AGC Regler VR19 so einstellen, dass ein klares und rauschfreies Bild entseht.
(6) Den Empfang auf allen Kanälen prüfen, kein Flackern darf entstehen.
Darauf achten dass das Bild nicht verschwindet wenn der Kontrastregler auf Maximum gedreht wird.
(7) TF AGC leicht nachjustieren falls erforderlich. In Bereichen wo der Sender sehr stark zu empfangen ist und leichte Synchronisationskappungen noch erscheinen, ist die Antenne zu kürzen um die Empfindlichkeit zu dämpfen.

AVR (Automatische Spannungsregelung)

Einen Voltmeter über B+ Versorgung und Chassis anschliessen. Darauf achten dass B+ Versorgungsspannung +11.5V ist, indem man den AVR Regler justiert (VR71)

Position der Ablenkeinheit (Abb. 2)

Die Ablenkeinheit ist mittels einer Schelle und Schraube am Hals der Bild Röhre befestigt. Um die Ablenkeinheit einzustellen und eine Korrektur der Bildlage vorzunehmen, ist die Schelle zu lösen und nach vorgenommener Korrektur mit Hilfe der Schraube wieder zu Befestigen.

Zentrieren (Abb. 2)

Die Bildzentrierungseinheit besteht aus zwei Ringen die sich am Ende der Ablenkeinheit befinden.
Jeder Ring hat einen Streifen um die Einstellung zu Vereinfachen. Die Streifen sind zu oder von einander zu bewegen bis das Bild sich genau in der Mitte der Bildröhre befindet.

Zeilenbreite

Den Spulenkern so justieren dass das Bild bis zu 13mm über die Maske hinaus ragt, der Helligkeitsregler sollte dabei in Normal Position sein.

DISASSEMBLY INSTRUCTION

CABINET REMOVAL
1. Remove 7 mounting screws (A) and 2 antenna terminal mouting screws (B) shown in Fig. 3, 4, 5.
2. Pull the cabinet towards you.

MAIN CIRCUIT BOARD REMOVAL
1. Remove 1 screw (C) shown in Fig. 6.
2. Pull off 3 small knobs (Volume, Bright and Contrast).
3. Pull the main circuit board towards you.

TUNER BLOCK REMOVAL
1. Pull off the control knobs, the fine tuning knobs and the channel selector knobs.
2. Remove 2 screws (D) shown in Fig. 6.

PICTURE TUBE REMOVAL
1. Disconnect the deflection yoke, the picture tube socket and the anode cap.
2. Remove 3 mounting screws (E) shown in Fig. 7.

DEMONTAGE ANLEITUNG

ENTFERNEN DES GEHÄUSES
1. Die 7 Halterungsschrauben (A) und 2 Schrauben für die Antennenanschlussplatte (B) entfernen wie in Abb. 3,4,5.
2. Gehäuses zuruckziehen.

AUSBAU DER VERSORGUNGSEINHEIT
1. 1 Schrauben (C) entfernen wie in Abb. 6.
2. Ziehen Sie die knöpfe für Lautstärke, Helligkeit und Kontrast.
3. Platine zurückziehen.

AUSBAU DER TUNER EINHEIT
1. Bedienungsknopfe, den Feinabstimmungsknopfe sowie die kanalwahlknopfe entfernen.
2. 2 Schrauben (D) entfernen wie in Abb. 6.

AUSBAU DER BILDRÖHRE
1. Losen sie die Ablenkeinheit, den Bildröhrensockel und die Anodenkappe.
2. Entfernen sie 3 Befestigungsschrauben (E) aus Abb. 7.

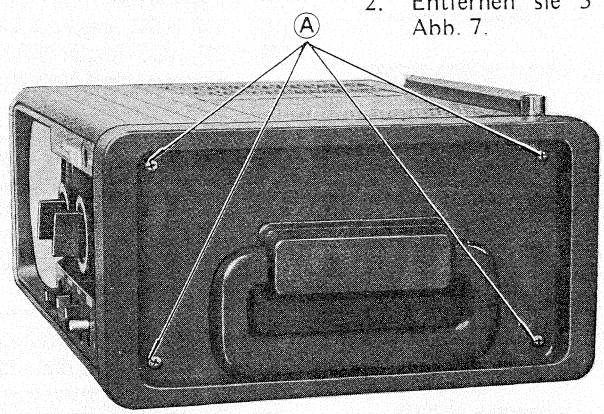


Fig. 3 Abb. 3

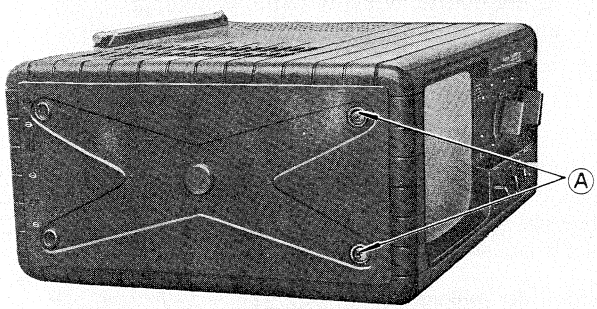


Fig. 4 Abb. 4

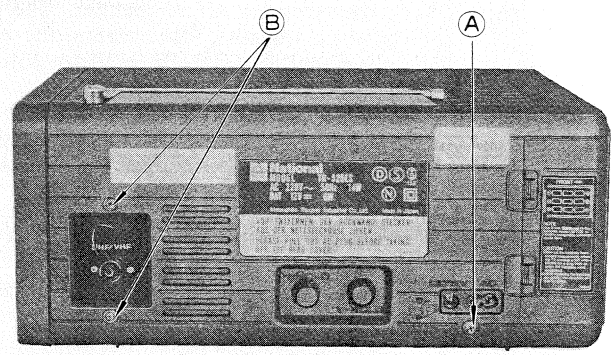


Fig. 5 Abb. 5

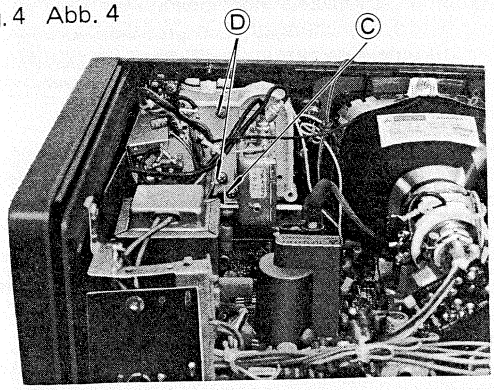


Fig. 6 Abb. 6

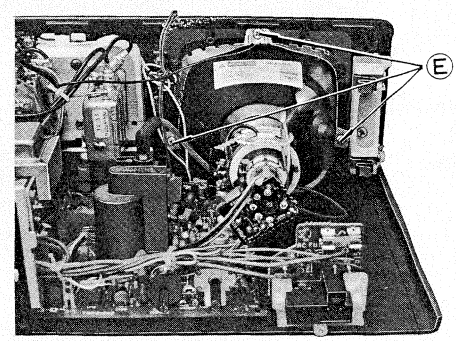


Fig. 7 Abb. 7

VIDEO I-F ALIGNMENT — BILD -ZF ADSTIMMUNG

EQUIPMENT CONNECTION

Disconnect the jumper lead (J104).
Power Supply
Supply DC+11.5V to TP91. See Fig. 8.
Supply DC+3.3V to TP12. See Fig. 8.
Oscilloscope, Sweep Generator
Connect as shown in Fig. 8.
Marker Generator
Couple loosely to the output lead of the sweep generator

VERBINDUNGSPLAN DER AUSRÜSTUNG

Brücke (J104). entfernen
Netzzufuhr
Zufuhr 11.5V DC an TP91 wie in Abb. 8.
Zufuhr 3.3V DC an TP12 wie in Abb. 8.
Oszilloskop, Wobbel Generator
Verbindung wie in Abb. 8.
Marken Generator
Lose koppeln an Ausgang des Wobbel Generators.

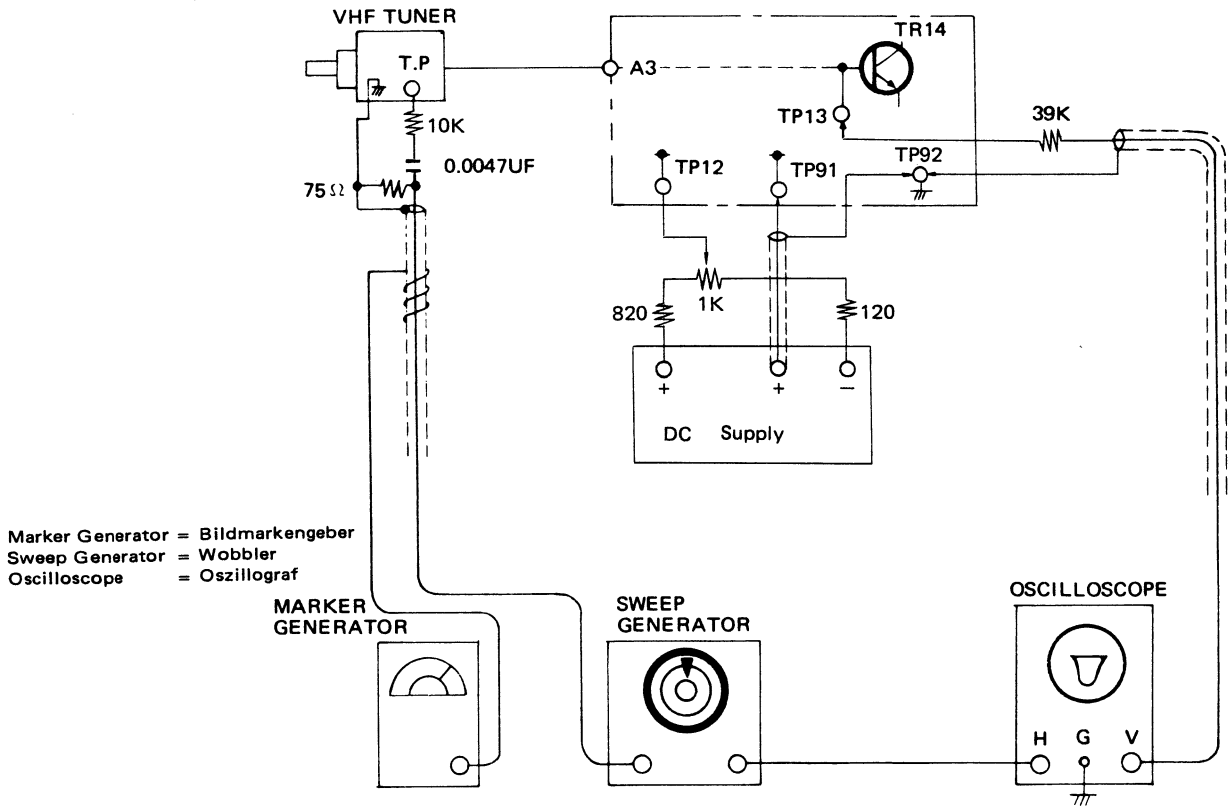


Fig. 8 Abb. 8

ALIGNMENT PROCEDURE — ABGLEICHVORGANG

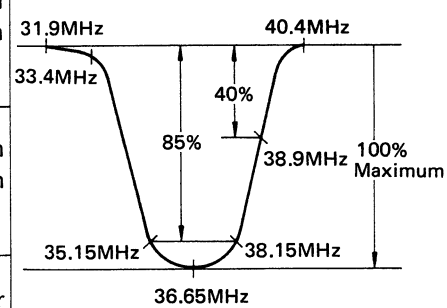
STEP	ALIGNMENT	WAVEFORM KURVENFORM	Schritt	ABGLEICHEN
1	Adjust L103 to the minimum gain at 40.4MHz marker position as shown in fig. 9.		1	L103 auf Minimum bei 40.4MHz Markierung wie in Abb. 9.
2	Adjust L102 to the minimum gain at 33.4MHz marker position as shown in fig. 9.		2	L102 auf Minimum bei 33.4MHz Markierung wie in Abb. 9.
3	Adjust both L101 and Tuner Convertor coil to obtain the correct response curve as shown in fig. 9.		3	Gleichen Sie sowohl L101 als auch die Abstimmspule am Tuner-Converter nach der Kurvenform wie in Abb. 9.

Fig. 9 Abb. 9

SOUND I-F ALIGNMENT — TON -ZF ABSTIMMUNG

EQUIPMENT CONNECTION

Disconnect the jumper lead(J104) and set the power switch to "ON" position. See Fig. 10.
Oscilloscope, Sweep Generator
Connect shown in Fig. 10.
Marker Generator
Couple loosely to the output lead of the sweep generator

VERBINDUNGSPLAN DER AUSRÜSTUNG

Brücke(J104)entfernen und Netzschalter auf "ON" Position stellen, Siehe Abb. 10.
Oszilloskop, Wobbelgenerator
wie in Abb. 10 verbinden.
Marken Generator
Lose koppeln an Ausgang vom Wobbel Generator.

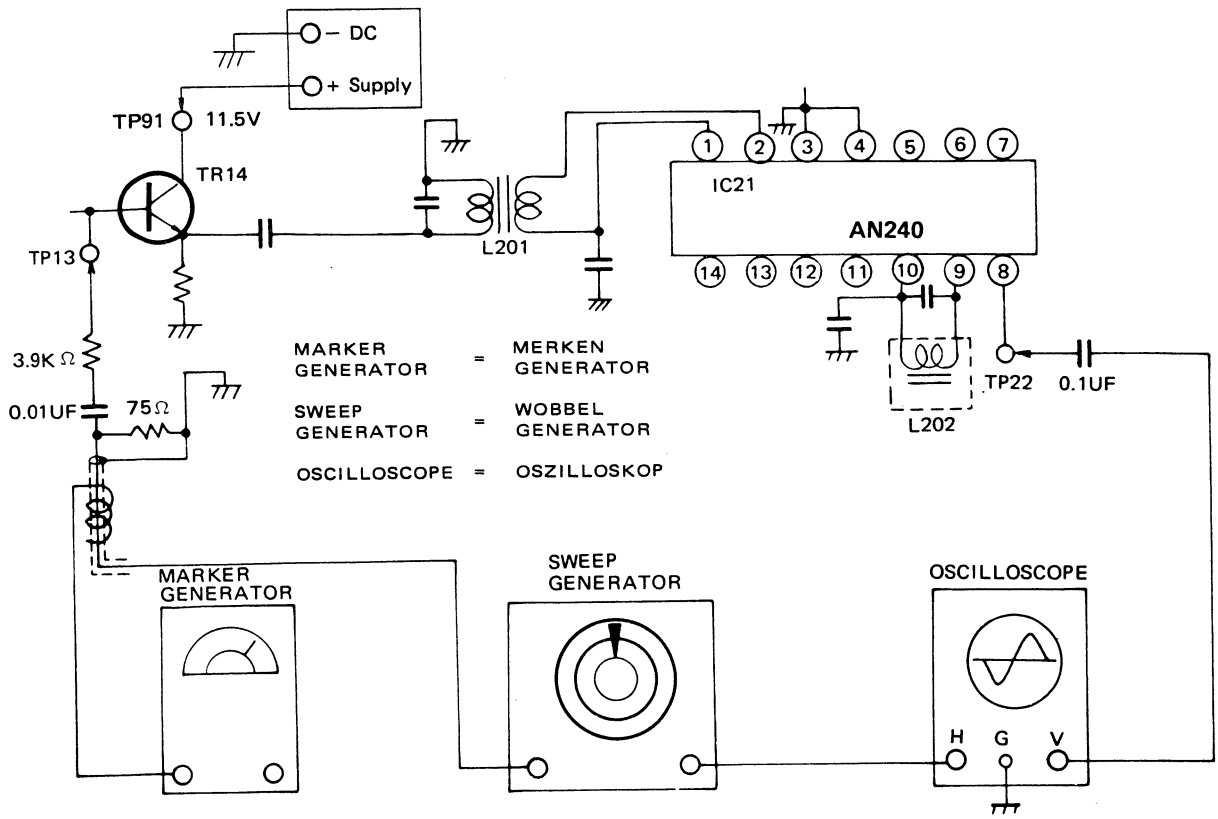
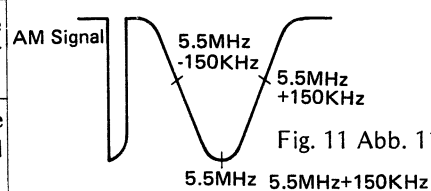
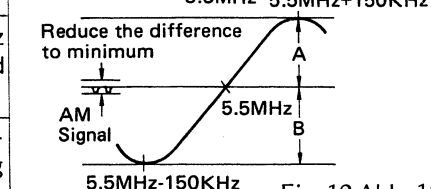


Fig. 10 Abb. 10

ALIGNMENT PROCEDURE — ABGLEICHVORGANG

STEP	ALIGNMENT	WAVEFORM KURVENFORM	Schritt	ABGLEICHEN
1	Adjust both L201 and L202 to the maximum gain at 5.5MHz maker position as shown in fig. 11.	 Fig. 11 Abb. 11	1	L201 und L202 Beide auf Maximum bei 5.5MHz Markierung wie in Abb. 11.
2	Adjust both L201 and L202 to the maximum gain at 5.5MHz AM signal as shown in fig. 11.		2	L201 und L202 Beide anf Maximum bei 5.5MHz amplitudenmodulation signal wie in Abb. 11.
3	Adjust L202 until the 5.5MHz marker is at the center of slanted line as shown in fig. 12.	 Fig. 12 Abb. 12	3	L202 so einstellen bis 5.5MHz Markierung in der Mitte der S Kurve ist wie in Abb.12.
4	Adjust L202 to reduce the difference of AM signal and blanking to zero as shown in fig. 12.		4	L202 so einstellen, do die Differenz zwischen amplitudenmodulation signal und austastim zu Null wird in Abb.12.

MAIN CIRCUIT BOARD

CONDUCTOR VIEW
TNP81822-39
(CHASSIS NO. T505-E)

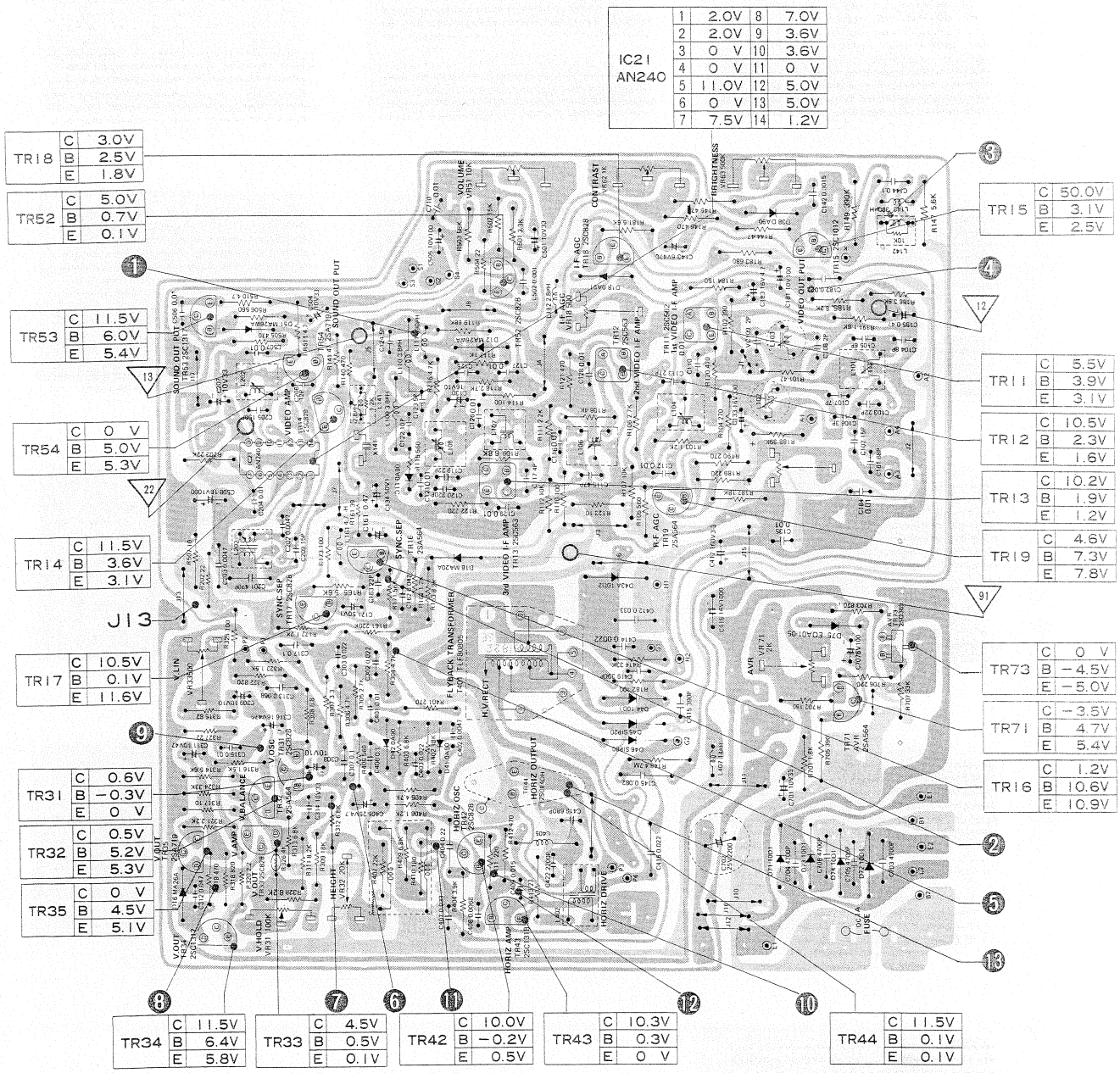


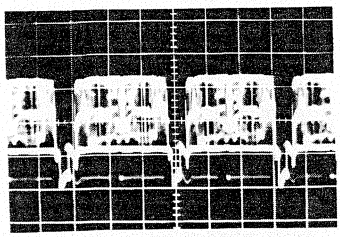
Fig. 13 Abb. 13

WAVEFORM PATTERN

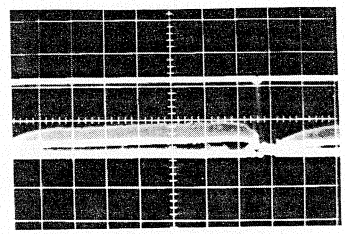
These waveforms were taken with C.C.I.R (VHF) signal.
The peak to peak voltage were measured setting brightness and contrast controls at maximum position.

WELLENFORMABBILDUNG

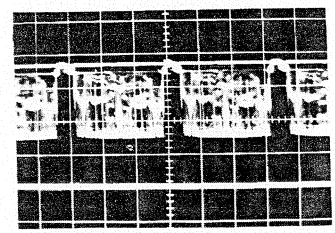
Diese Wellenformen wurden mit C.C.I.R. (VHF) Signal gemessen.
Die s/s Volt Messung wurde erreicht mit Helligkeit und Kontrast Wahlschalter in Stellung Maximum.



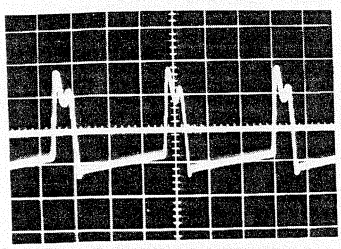
① 0.65Vp-p



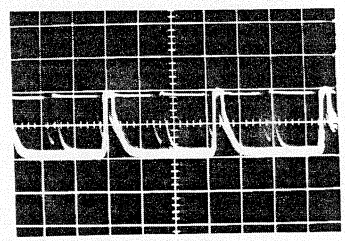
② 12Vp-p



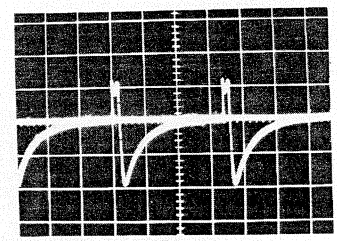
③ 40Vp-p



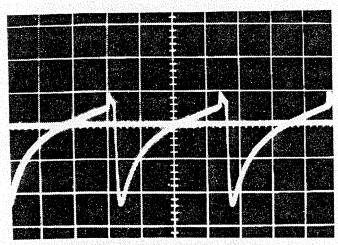
④ 18Vp-p



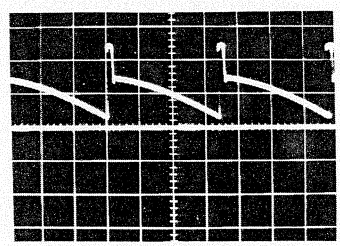
⑤ 10Vp-p



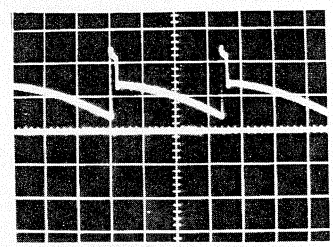
⑥ 3Vp-p



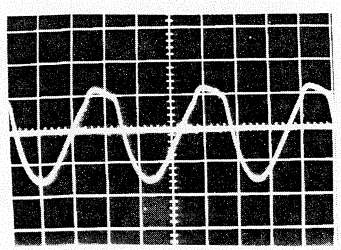
⑦ 1.2Vp-p



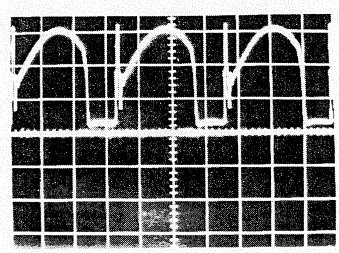
⑧ 12Vp-p



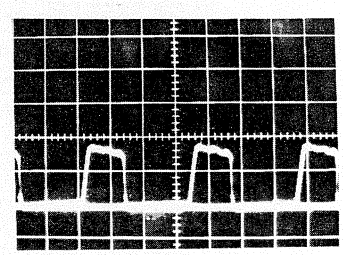
⑨ 13Vp-p



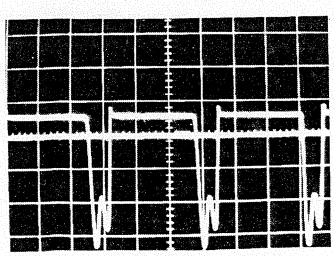
⑩ 6Vp-p



⑪ 15Vp-p

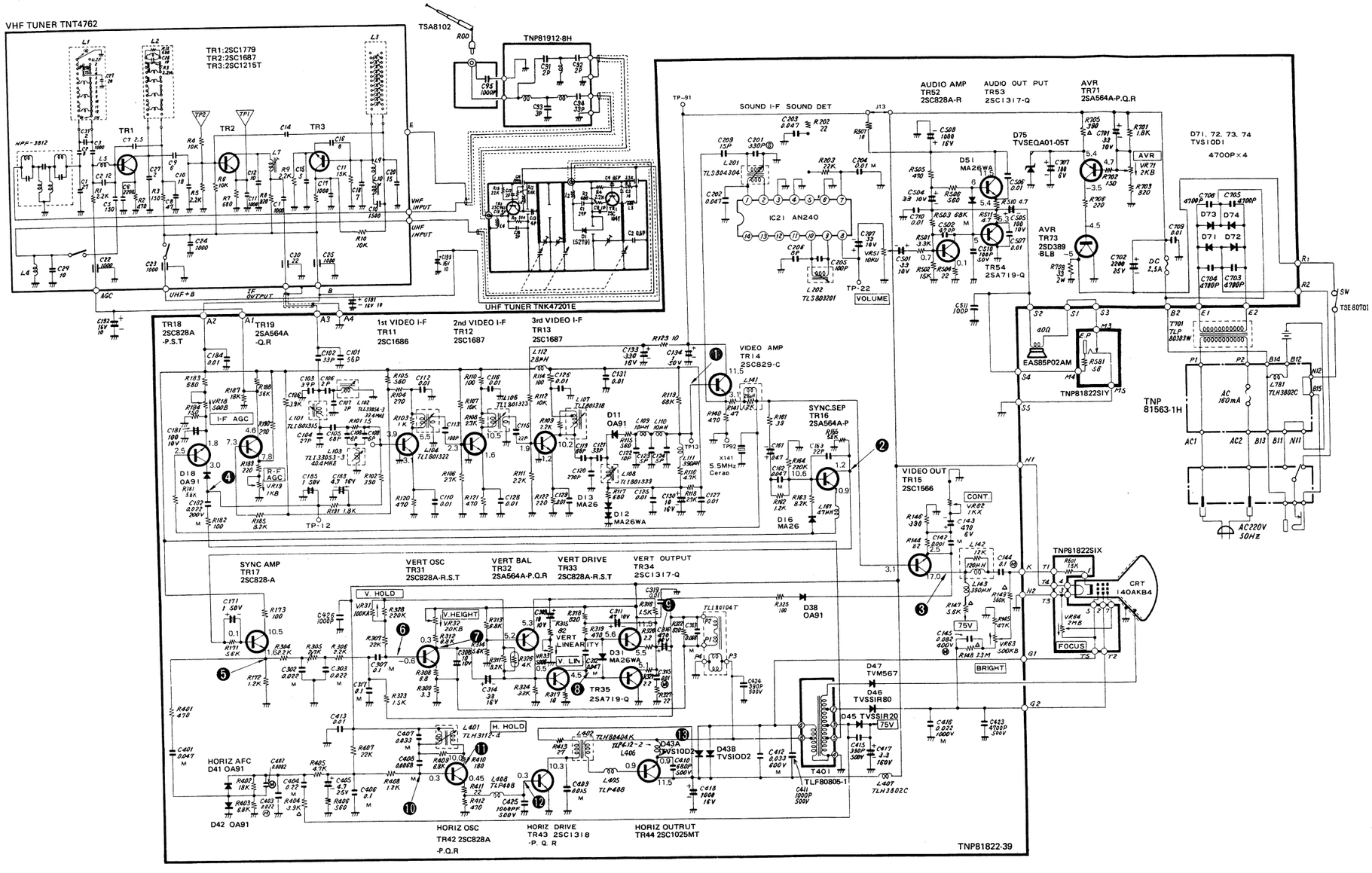


⑫ 0.8Vp-p

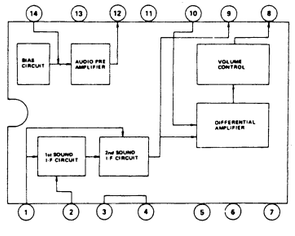


⑬ 80Vp-p

SCHEMATIC DIAGRAM FOR MODEL TR-525ES



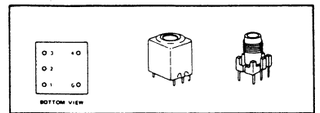
IC21 AN240



TRANSISTOR BASE INFORMATION

2SC717	2SC683	2SC761 2SC948	2SA683 2SA751 2SC1383	2SC901A
2SA564A 2SC564A 2SC828A 2SC1215 2SC829 2SC1318	2SC1012	2SA699 2SC1226	2SC562 2SC563	2SD389

TRANSFORMER TERMINAL INFORMATION

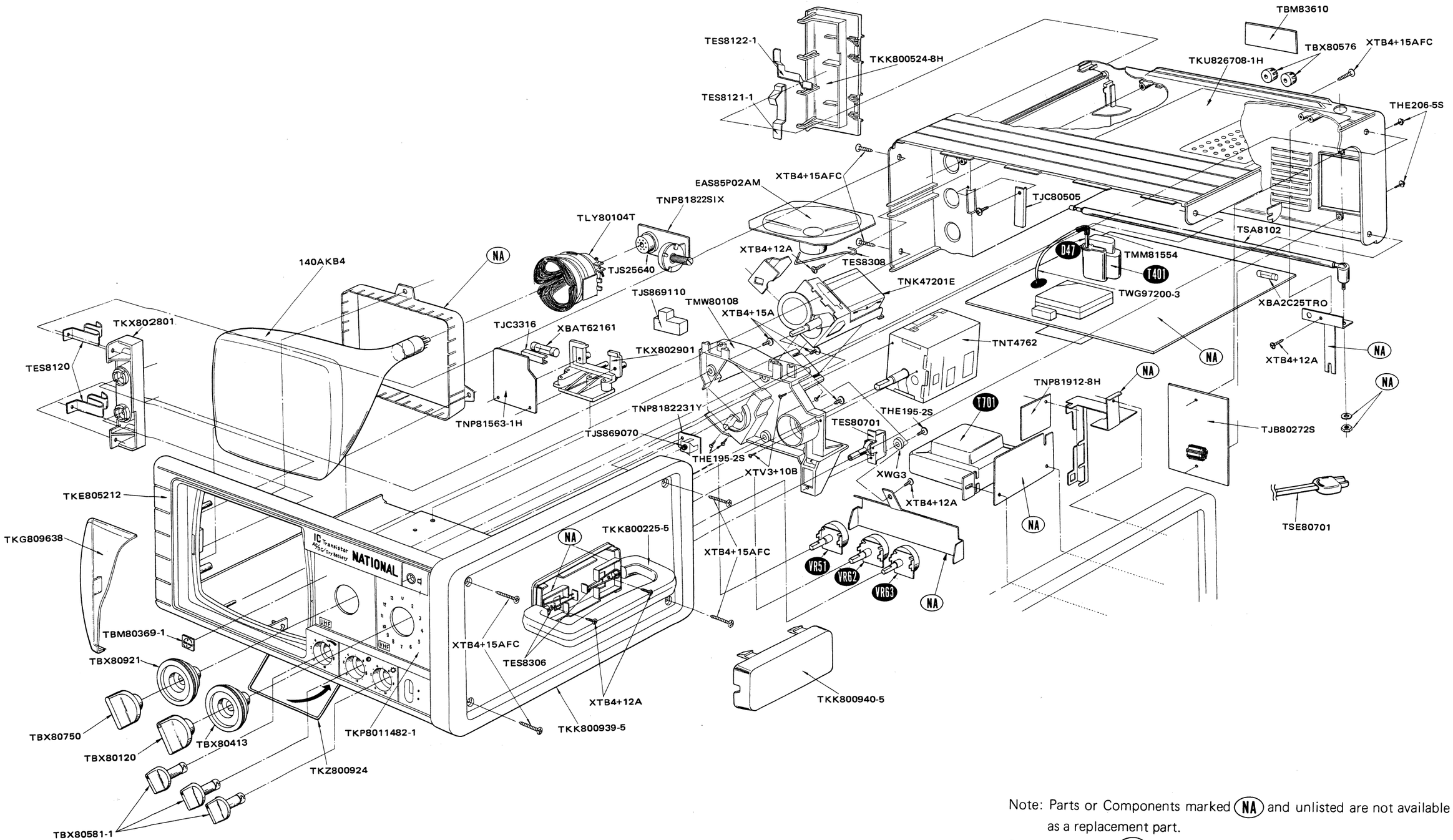


L101 L104 L106 L107 L108
L201 L202

NOTE

1. RESISTOR
   All resistors are carbon 1/4W resistor, unless otherwise noted the following marks.
   Unit of resistance is OHM (Ω). (K=1,000, M=1,000,000)
   △ : Solid resistor ● : Metal oxide resistor
   □ : Wire wound resistor : Thermistor
   : Fuse resistor F : None flame resistor
2. CAPACITOR
   All capacitors are ceramic 50V capacitor, unless otherwise noted the following marks.
   Unit of capacitance is μF, unless otherwise noted.
   M : Polyester capacitor S : Polystylene capacitor
   : Electrolytic capacitor
3. COIL
   Unit of inductance is μH.
4. TEST POINT
   ▽ : Test point position
5. VOLTAGE MEASUREMENT
   Voltage is measured by a volt ohm meter with DC 20K OHM/V receiving normal signal, when all controls are set to the maximum position.
6. Number in red circle indicates waveform number.
7. When arrow mark (↗) is found, connection is easily found along with the direction of an arrow.
8. When schematic diagram of a board is described in more than two places, they are encircled with dotted line (— · —).
9. This schematic diagram is the latest at the time of printing and subject to change without notice.

EXPLODED VIEW



Note: Parts or Components marked (NA) and unlisted are not available as a replacement part.

Bemerkung: Mit (NA) gekennzeichnete Teile order baluelemente und Teile die nicht in der Ersatzteilliste aufgeführt sind, sind nich als Ersatzteile erhältlich.

REPLACEMENT PARTS LIST — ERSATZEILLSTE

Note: TNP81822-39 (Main Board) is not available as a complete printed circuit board.

Bemerkung: TNP81822-39 die gedruckte schaltung ist nicht als komplet bestückte einheit lieferbar.

REF. NO.	PARTS NO.	PARTS NAME & DESCRIPTION
	MAIN PARTS	
	TKE805212	Escutcheon
	TKP8011482-1	Control Panel
	TKU826708-1H	Rear Cover Complete
	TBM83610	Model Plate
	TBM80369-1	National Badge
	TKG809638	Front Glass
	TBX80120	VHF Inner Knob
	TBX80413	VHF Outer Knob
	TBX80750	UHF Inner Knob
	TBX80921	UHF Outer Knob
	TBX80581-1	Small Knob
	TBX80576	V/H Hold Knob
	TKX802901	Power Socket Holder
	TKK800524-8H	Battery Cover
	TKK800939-5	Side Plate
	TKK800940-5	Handle Holder Cover
	TKX802801	Battery Spring Holder
	TKK800225-5	Handle
	TKZ800924	Set Leg
	140AKB4	Picture Tube
	TNP81563-1H	Power Circuit Board Complete
	TNP81912-8H	U/V Signal Separator Circuit Board Complete
	TNP81822S1X	Picture Tube Socket Circuit Board Complete
	TNP81822S1X	Earphone Socket Circuit Board Complete
	TNT4762	VHF Tuner
	TNK47201E	UHF Tuner
	TLY80104T	Deflection Yoke
	EAS85P02AM	Speaker
	EAE3YDAA	Earphone
	TSA8102	Rod Antenna
	TSE80701	Power Switch
	XBAT62161	Fuse 160mA
	TSX8142	Power Cord
	TSX8342-2	Car Cord Complete
	TJB80272S	Antenna Terminal Board Complete
	TJS869110	AC/DC Socket
	TPC811051	Outer Carton
	XAPD01506B	Filler Complete
	TPE84023	Set Cover
	TQB811056	Fan Bag
	TQB810056	Instruction Book
	TQB810027	Instruction Sheet
	OTHER PARTS	
	TES8308	Speaker Mounting Nail
	TJC80505	Battery Terminal
	TES8121-1	Battery Terminal Spring (B)
	TES8122-1	Battery Terminal Spring (C)
	TWG97200-3	High Voltage Wire With Cap
	TMM81554	Selen Cap
	TES8306	Handle Mounting Shaft Spring
	TES8120	Battery Terminal Spring (A)
	TMW80108	Tuner Bracket
	TJC3316	Fuse Holder
	TJS869070	Earphone Socket
	TJS25640	Picture Tube Socket
	XBA2C25TRO	Fuse DC IA
	SCREWS & WASHERS	
	XTB4+15AFC	Rear Cover Mounting Screw
	THE206-5S	Antenna Terminal Board Mounting Screw
	XTB4+12A	Antenna, Speaker Mounting Screw
	XTB4+15A	Tuner Block Mounting Screw
	XTB4+12A	Control Panel, Handle, Mounting Screw
	THE195-2S	UHF Tuner, Power Switch Mounting Screw
	XTV3+10B	VHF Tuner Mounting Screw
	XWG3	Power Switch Mounting Washer

REF. NO.	PARTS NO.	PARTS NAME & DESCRIPTION
	TRANSISTORS	
TR11	2SC1686	1st Video I-F
TR12	2SC1687	2nd Video I-F
TR13	2SC1687	3rd Video I-F
TR14	2SC829C	Video Amp
TR15	2SC1566	Video Output
TR16	2SA564A	Sync Sep
TR17	2SC828A	Sync Amp
TR18	2SC828A	IF AGC
TR19	2SA564A	RF AGC
TR31	2SC828A	V-OSC
TR32	2SA564A	V-Balance
TR33	2SC828A	V-Drive
TR34	2SC1317	V-Output
TR35	2SA719	V-Output
TR42	2SC828A	H-OSC
TR43	2SC1318	H-Drive
TR44	2SC1025MT	H-Output
TR52	2SC828A	Audio Amp
TR53	2SC1317	Audio Output
TR54	2SA719	Audio Output
TR71	2SA564A	AVR
TR73	2SD389BLB	AVR
	DIOES	
D11	OA91	Video Detector
D12	MA26WA	Blanking
D13	MA26	Blanking
D16	MA26	Sync Sep
D18	OA91	IF AGC
D31	MA26WA	Balance
D38	OA91	Temperature Control
D41	OA91	Horiz. AFC
D42	OA91	Horiz. AFC
D43A	TVS10D2	Damper
D45	TVSS1R20	Rectifier
D46	TVSS1R80	Focus
D47	TVM567	High Voltage Rectifier
D51	MA26WA	Audio
D71	TVS10D1	Power Rectifier
D72	TVS10D1	Power Rectifier
D73	TVS10D1	Power Rectifier
D74	TVS10D1	Power Rectifier
D75	TVSEQA01-05T	Zener
D43B	TVS10D2	Diode
	IC	
IC21	AN240	Audio
	COILS	
L101	TLI801315	Video I-F Input Coil
L102	TLI33054-3	Trap Coil
L103	TLI33053-3	Trap Coil
L104	TLI801322	1st Video I-F
L106	TLI801323	2nd Video I-F
L107	TLI801318	3rd Video I-F
L108	TLI801339	Video Detector
L109	TLQ100-999	Peaking Coil 10uH
L110	TLQ100-999	Peaking Coil 10uH
L111	TLT391-999	Peaking Coil 390uH
L112	TLT028-999	Peaking Coil 2.8uH
L141	TLU028-122	Peaking Coil 2.8uH
L142	TLU121-123	Peaking Coil 120uH
L143	TLT391-999	Peaking Coil 390uH
L161	TLT470-999	Peaking Coil 47uH

REF. NO.	PARTS NO.	PARTS NAME & DESCRIPTION
L201	TLS804304	Sound I-F Input Coil
L202	TLS803201	Sound I-F Input Coil
L401	TLH3112-4	H. Hold
L402	TLH80404K	H. Drive
L405	TLP408	Chake Coil
L406	TLP412-2	Choke Coil
L407	TLH3802C	H. Width
L408	TLP408	Choke Coil
L781	TLH3802C	Choke Coil
	RESISTORS	
R101	ERD14TJ150	Carbon 15Ω +5%–5% ¼W
R102	ERD14TJ391	Carbon 390Ω +5%–5% ¼W
R103	ERD14TJ102	Carbon 1KΩ +5%–5% ¼W
R104	ERD14TJ271	Carbon 270Ω +5%–5% ¼W
R105	ERD14TJ561	Carbon 560Ω +5%–5% ¼W
R106	ERD14TJ272	Carbon 2.7KΩ +5%–5% ¼W
R107	ERD14TJ103	Carbon 10KΩ +5%–5% ¼W
R108	ERD14TJ272	Carbon 2.7KΩ +5%–5% ¼W
R109	ERD14TJ222	Carbon 2.2KΩ +5%–5% ¼W
R110	ERD14TJ101	Carbon 100Ω +5%–5% ¼W
R111	ERD14TJ222	Carbon 2.2KΩ +5%–5% ¼W
R112	ERD14TJ103	Carbon 10KΩ +5%–5% ¼W
R114	ERD14TJ101	Carbon 100Ω +5%–5% ¼W
R115	ERD14TJ561	Carbon 560Ω +5%–5% ¼W
R116	ERD14TJ472	Carbon 4.7KΩ +5%–5% ¼W
R117	ERD14TJ681	Carbon 680Ω +5%–5% ¼W
R118	ERD14TJ272	Carbon 2.7KΩ +5%–5% ¼W
R119	ERD14TJ683	Carbon 68KΩ +5%–5% ¼W
R120	ERD14TJ471	Carbon 470Ω +5%–5% ¼W
R121	ERD14TJ471	Carbon 470Ω +5%–5% ¼W
R122	ERD14TJ221	Carbon 220Ω +5%–5% ¼W
R123	ERD14FJ100	Carbon 10Ω +5%–5% ¼W
R140	ERD14TJ471	Carbon 470Ω +5%–5% ¼W
R141	ERD14TJ470	Carbon 47Ω +5%–5% ¼W
R144	ERD14TJ820	Carbon 82Ω +5%–5% ¼W
R145	ERC12GJ473	Solid 47KΩ +5%–5% ½W
R146	ERD14TJ391	Carbon 390Ω +5%–5% ¼W
R147	ERC12GJ562	Solid 5.6KΩ +5%–5% ½W
R148	ERC12GJ335	Solid 3.3MΩ +5%–5% ½W
R149	ERC12GJ564	Solid 560KΩ +5%–5% ½W
R161	ERD14TJ390	Carbon 39Ω +5%–5% ¼W
R162	ERD14TJ122	Carbon 1.2KΩ +5%–5% ¼W
R163	ERD14TJ822	Carbon 8.2KΩ +5%–5% ¼W
R164	ERD14TJ224	Carbon 220KΩ +5%–5% ¼W
R165	ERD14TJ562	Carbon 5.6KΩ +5%–5% ¼W
R171	ERD14TJ563	Carbon 56KΩ +5%–5% ¼W
R172	ERD14TJ122	Carbon 1.2KΩ +5%–5% ¼W
R173	ERD14TJ101	Carbon 100Ω +5%–5% ¼W
R181	ERD14TJ562	Carbon 5.6KΩ +5%–5% ¼W
R182	ERD14TJ101	Carbon 100Ω +5%–5% ¼W
R183	ERD14TJ681	Carbon 680Ω +5%–5% ¼W
R184	ERD14TJ151	Carbon 150Ω +5%–5% ¼W
R185	ERD14TJ822	Carbon 8.2KΩ +5%–5% ¼W
R186	ERD14TJ392	Carbon 3.9KΩ +5%–5% ¼W
R187	ERD14TJ183	Carbon 18KΩ +5%–5% ¼W
R188	ERD14TJ563	Carbon 56KΩ +5%–5% ¼W
R189	ERD14TJ221	Carbon 220Ω +5%–5% ¼W
R190	ERD14TJ271	Carbon 270Ω +5%–5% ¼W
R191	ERD14TJ182	Carbon 1.8KΩ +5%–5% ¼W
R202	ERD14FJ220	Carbon 22Ω +5%–5% ¼W
R203	ERD14TJ223	Carbon 22KΩ +5%–5% ¼W
R304	ERD14TJ222	Carbon 2.2KΩ +5%–5% ¼W
R305	ERD14TJ272	Carbon 2.7KΩ +5%–5% ¼W
R306	ERD14TJ222	Carbon 2.2KΩ +5%–5% ¼W
R307	ERD14TJ223	Carbon 22KΩ +5%–5% ¼W

REF. NO.	PARTS NO.	PARTS NAME & DESCRIPTION
R308	ERD14TJ6R8	Carbon 6.8Ω +5%–5% ¼W
R309	ERD14TJ3R3	Carbon 3.3Ω +5%–5% ¼W
R311	ERD14TJ822	Carbon 8.2KΩ +5%–5% ¼W
R312	ERD14TJ682	Carbon 6.8KΩ +5%–5% ¼W
R313	ERD14TJ682	Carbon 6.8KΩ +5%–5% ¼W
R314	ERD14TJ562	Carbon 5.6KΩ +5%–5% ¼W
R315	ERD14TJ820	Carbon 82Ω +5%–5% ¼W
R316	ERD14TJ152	Carbon 1.5KΩ +5%–5% ¼W
R317	ERD14TJ100	Carbon 10Ω +5%–5% ¼W
R318	ERD14TJ821	Carbon 820Ω +5%–5% ¼W
R319	ERD14TJ471	Carbon 470Ω +5%–5% ¼W
R320	ERD14FJ2R2	Carbon 2.2Ω +5%–5% ¼W
R321	ERD14FJ2R2	Carbon 2.2Ω +5%–5% ¼W
R322	ERD14TJ821	Carbon 820Ω +5%–5% ¼W
R323	ERD14TJ152	Carbon 1.5KΩ +5%–5% ¼W
R324	ERD14TJ333	Carbon 33KΩ +5%–5% ¼W
R325	ERD14TJ101	Carbon 100Ω +5%–5% ¼W
R326	ERTD3ZHL402S	Thermistor 4KΩ ¼W
R327	ERD14TJ220	Carbon 22Ω +5%–5% ¼W
R328	ERD14TJ224	Carbon 220KΩ +5%–5% ¼W
R401	ERD14TJ471	Carbon 470Ω +5%–5% ¼W
R402	ERD14TJ183	Carbon 18KΩ +5%–5% ¼W
R403	ERD14TJ682	Carbon 6.8KΩ +5%–5% ¼W
R404	ERC12GJ392	Solid 3.9KΩ +5%–5% ½W
R405	ERD14TJ472	Carbon 4.7KΩ +5%–5% ¼W
R406	ERD14TJ561	Carbon 560Ω +5%–5% ¼W
R407	ERD14TJ223	Carbon 22KΩ +5%–5% ¼W
R408	ERD14TJ122	Carbon 1.2KΩ +5%–5% ¼W
R409	ERD14TJ682	Carbon 6.8KΩ +5%–5% ¼W
R410	ERD14TJ181	Carbon 180Ω +5%–5% ¼W
R411	ERD14TJ220	Carbon 22Ω +5%–5% ¼W
R412	ERD14TJ471	Carbon 470Ω +5%–5% ¼W
R413	ERD12FJ270	Carbon 27Ω +5%–5% ½W
R501	ERD14TJ332	Carbon 3.3KΩ +5%–5% ¼W
R502	ERD14TJ153	Carbon 15KΩ +5%–5% ¼W
R503	ERD14TJ683	Carbon 68KΩ +5%–5% ¼W
R504	ERD14TJ220	Carbon 22Ω +5%–5% ¼W
R505	ERD14TJ471	Carbon 470Ω +5%–5% ¼W
R506	ERD14TJ561	Carbon 560Ω +5%–5% ¼W
R507	ERD14FJ100	Carbon 10Ω +5%–5% ¼W
R510	ERD14FJ4R7	Carbon 4.7Ω +5%–5% ¼W
R511	ERD14FJ4R7	Carbon 4.7Ω +5%–5% ¼W
R581	ERD14TJ560	Carbon 56Ω +5%–5% ¼W
R601	ERD14TJ152	Carbon 1.5KΩ +5%–5% ¼W
R701	ERD14TJ182	Carbon 1.8KΩ +5%–5% ¼W
R702	ERD14TJ151	Carbon 150Ω +5%–5% ¼W
R703	ERD14TJ821	Carbon 820Ω +5%–5% ¼W
R705	ERC12GJ391	Solid 390Ω +5%–5% ½W
R706	ERD14TJ221	Carbon 220Ω +5%–5% ¼W
R708	TRF2SJ330	Non Flame 33Ω +5%–5% 2W

CAPACITORS

C91	ECCD2H020C	Ceramic 2pF +0.25pF–0.25pF 500V
C92	ECCD2H020C	Ceramic 2pF +0.25pF–0.25pF 500V
C93	ECCD2H030C	Ceramic 3pF +0.25pF–0.25pF 500V
C94	ECCD2H330K	Ceramic 33pF +10%–10% 500V
C95	ECKD2H102PE	Ceramic 0.01uF +100%–0% 500V
C101	ECCD1H560K	Ceramic 56pF +10%–10% 50V
C102	ECCD1H330K	Ceramic 33pF +10%–10% 50V
C103	ECCD1H390K	Ceramic 39pF +10%–10% 50V
C104	ECCD1H270K	Ceramic 27pF +10%–10% 50V
C105	ECCD1H680K	Ceramic 68pF +10%–10% 50V
C106	ECCD1H020CC	Ceramic 2pF +0.25pF–0.25pF 50V
C107	ECCD1H020CC	Ceramic 2pF +0.25pF–0.25pF 50V
C108	ECCD1H060DC	Ceramic 6pF +0.5pF–0.5pF 50V
C109	ECCD1H060DC	Ceramic 6pF +0.5pF–0.5pF 50V
C110	ECKD1H103PF	Ceramic 0.01uF +100%–0% 50V
C112	ECKD1H103PF	Ceramic 0.01uF +100%–0% 50V

REF. NO.	PARTS NO.	PARTS NAME & DESCRIPTION
C113	ECCD1H101K	Ceramic 100pF +100%–0% 50V
C115	ECCD1H220K	Ceramic 22pF +10%–10% 50V
C116	ECKD1H103PF	Ceramic 0.01uF +100%–0% 50V
C119	ECCD1H680J	Ceramic 68pF +5%–5% 50V
C120	ECCD1H271J	Ceramic 270pF +5%–5% 50V
C121	ECCD1H330J	Ceramic 33pF +5%–5% 50V
C122	ECCD1H100D	Ceramic 10pF +0.5pF–0.5pF 50V
C123	ECCD1H050D	Ceramic 5pF +0.5pF–0.5pF 50V
C124	ECCD1H050D	Ceramic 5pF +0.5pF–0.5pF 50V
C125	ECKD1H103PF	Ceramic 0.01uF +100%–0% 50V
C126	ECKD1H103PF	Ceramic 0.01uF +100%–0% 50V
C127	ECKD1H103PF	Ceramic 0.01uF +100%–0% 50V
C128	ECKD1H103PF	Ceramic 0.01uF +100%–0% 50V
C129	ECKD1H103PF	Ceramic 0.01uF +100%–0% 50V
C130	ECEA16V10L	Electrolytic 10uF 16V
C131	ECKD1H103PF	Ceramic 0.01uF +100%–0% 50V
C133	ECEA16V330L	Electrolytic 330uF 16V
C134	ECEA50V1L	Electrolytic 1uF 50V
C142	ECQM05102KZ	Polyester 1000pF +10%–10% 50V
C143	ECEA6V47OL	Electrolytic 470uF 6V
C144	ECQM05104KZ	Polyester 0.1uF +10%–10% 50V
C145	ECQM4823KZ	Polyester 0.082uF+10%–10% 400V
C161	ECAG25ER47	Electrolytic 0.47uF 25V
C162	ECQM05473KZ	Polyester 0.047uF+10%–10% 50V
C163	ECCD1H220K	Ceramic 22pF +10%–10% 50V
C171	ECEA50V1L	Electrolytic 1uF 50V
C181	ECEA10V100L	Electrolytic 100uF 10V
C182	ECQM2223KZ	Polyester 0.022uF+10%–10% 200V
C183	ECSZ16EF4R7	Electrolytic 4.7uF 16V
C184	ECKD1H103PF	Ceramic 0.01uF +100%–0% 50V
C185	ECEA50V1L	Electrolytic 1uF 50V
C191	ECEA16V10L	Electrolytic 10uF 16V
C192	ECEA16V10L	Electrolytic 10uF 16V
C193	ECEA16V10L	Electrolytic 10uF 16V
C201	ECQS1331J	Styrol 330pF +5%–5% 100V
C202	ECKD1H473ZF	Ceramic 0.047uF+80%–20% 50V
C203	ECKD1H473ZF	Ceramic 0.047uF+80%–20% 50V
C204	ECQM05103KZ	Polyester 0.01uF +10%–10% 50V
C205	ECCD1H101J	Ceramic 100pF +5%–5% 50V
C206	ECCD1H080DC	Ceramic 8pF +0.5pF–0.5pF 50V
C207	ECEA10V33L	Electrolytic 33uF 10V
C209	ECCD1H150J	Ceramic 15pF +5%–5% 50V
C302	ECQM05223KZ	Polyester 0.022uF+10%–10% 50V
C303	ECQM05223KZ	Polyester 0.022uF+10%–10% 50V
C307	ECQM05104KZ	Polyester 0.1uF +10%–10% 50V
C308	ECSZ10EF10N	Electrolytic 10uF 10V
C309	ECSZ10EF10N	Electrolytic 10uF 10V
C311	ECEA10V47L	Electrolytic 47uF 10V
C312	ECQM05473KZ	Polyester 0.047uF+10%–10% 50V
C313	ECQM05683KZ	Polyester 0.068uF+10%–10% 50V
C314	ECEA16V33L	Electrolytic 33uF 16V
C315	ECQM05103KZ	Polyester 0.01uF +10%–10% 50V
C316	ECEA16V470L	Electrolytic 470uF 16V
C317	ECQM05104KZ	Polyester 0.1uF +10%–10% 50V
C319	ECKD1H103PF	Ceramic 0.01uF +100%–0% 50V
C401	ECQM05473KZ	Polyester 0.047uF+10%–10% 50V
C402	ECQM05822KZ	Polyester 8200uF +10%–10% 50V
C403	ECQM05223KZ	Polyester 0.022uF+10%–10% 50V
C404	ECQM05224KZ	Polyester 0.22uF +10%–10% 50V
C405	ECEA25V4R7L	Electrolytic 4.7uF 25V
C406	ECQM05104KZ	Polyester 0.1uF +10%–10% 50V
C407	ECQM05333JZ	Polyester 0.033uF+5%–5% 50V
C408	ECQM05682KZ	Polyester 6800pF +10%–10% 50V
C409	ECQM05153KZ	Polyester 0.015uF+10%–10% 50V
C410	ECKD2H681MB	Ceramic 680pF +20%–20% 500V
C411	ECKD2H102MB	Ceramic 1000pF +20%–20% 500V

REF. NO.	PARTS NO.	PARTS NAME & DESCRIPTION
C412	ECQM6333KZ	Polyester 0.033uF+10%−10% 600V
C413	ECKD1H103PF	Ceramic 0.01uF +100%−0% 50V
C415	ECKD2H391KB	Ceramic 390pF +10%−10% 500V
C416	ECQE10223KZ	Polyester 0.022uF+10%+10% 1KV
C417	ECEA160V3R3	Electrolytic 3.3uF 160V
C418	ECEA16V1000L	Electrolytic 1000uF 16V
C423	ECKD2H472PE	Ceramic 4700pF +100%−0% 500V
C424	ECKD2H391KB	Ceramic 390pF +10%−10% 500V
C425	ECKD2H102MB	Ceramic 1000pF +20%−20% 500V
C426	ECKD1H102MB	Ceramic 1000pF +20%−20% 50V
C501	ECEA10V33L	Electrolytic 33uF 10V
C502	ECKD1H471KB	Ceramic 470pF +10%−10% 50V
C504	ECEA10V33L	Electrolytic 33uF 10V
C505	ECEA10V100L	Electrolytic 100uF 10V
C506	ECKD1H103PF	Ceramic 0.01uF +100%−0% 50V
C507	ECKD1H103PF	Ceramic 0.01uF +100%−0% 50V
C508	ECEA16V1000L	Electrolytic 1000uF 16V
C510	ECCD1H101K	Ceramic 100pF +10%−10% 50V
C515	ECCD1H101K	Ceramic 100pF +10%−10% 50V
C701	ECEA10V33L	Electrolytic 33uF 10V
C702	ECEA25V2200L	Electrolytic 2200uF 25V
C703	ECKD2H472PE	Ceramic 4700pF +100%−0% 500V
C704	ECKD2H472PE	Ceramic 4700pF +100%−0% 500V

REF. NO.	PARTS NO.	PARTS NAME & DESCRIPTION
C705	ECKD2H472PE	Ceramic 4700pF +100%−0% 500V
C706	ECKD2H472PE	Ceramic 4700pF +100%−0% 500V
C707	ECEA6V100L	Electrolytic 100uF 6V
C709	ECKD1H103PF	Ceramic 0.01uF +100%−0% 50V
C710	ECKD1H103PF	Ceramic 0.01uF +100%−0% 50V
	CERAP	
X141	EFCA5R5M1	5.5MHZ Cerap
	CONTROLS	
VR18	EVTS3AA00B52	IF AGC 500ΩB
VR19	EVTS3AA00B13	RF AGC 1KΩB
VR31	EVD66A25KA15	V. Hold 100KΩA
VR32	EVTS3AA00B24	V. Height 20KΩB
VR33	EVTS3AA00B52	V. Lin 500ΩB
VR51	EVVC0AF25U14	Sound 10KΩU
VR62	EVVC1AF2513X	Contrast 1KΩX
VR63	EVVC0AF25B55	Brightness 500KΩB
VR64	EVD26AS10B26	Focus 2MΩB
VR71	EVTS3AA00B23	AVR 2KΩB
	TRANSFORMERS	
T401	TLF80805-1	Flyback Transformer
T701	TLP80303W	Power Transformer

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